

Claims

1. An immunogenic composition comprising

- 5 i) at least one fragment of TGF- β capable of eliciting an immunostimulating effect in an individual, and
- ii) at least one immunogenic determinant against which it is desirable to elicit an immunogenic response,

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wherein said at least one fragment of TGF- β and said at least one immunogenic determinant are not identical.

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2. The immunogenic composition according to claim 1, wherein said fragment of TGF- β comprises the amino acid sequence

Ala - Leu - Asp - Ala - Ala - Tyr - Cys - Phe - Arg - Asn - Val - Gln - Asp -
Asn - Cys - Cys - Leu - Arg - Pro - Leu - Tyr - Ile - Asp - Phe - Lys - Arg -
Asp - Leu - Gly (SEQ ID NO: 1)

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including any functional equivalents thereof obtained by addition, substitution or deletion of at least one amino acid.

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3. The immunogenic composition according to claim 1, wherein said fragment of TGF- β essentially consists of the amino acid sequence

Ala - Leu - Asp - Ala - Ala - Tyr - Cys - Phe - Arg - Asn - Val - Gln - Asp -
Asn - Cys - Cys - Leu - Arg - Pro - Leu - Tyr - Ile - Asp - Phe - Lys - Arg -
Asp - Leu - Gly (SEQ ID NO: 1)

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including any functional equivalents thereof obtained by addition, substitution or deletion of at least one amino acid.

4. The immunogenic composition according to claim 1, wherein said fragment of TGF- β consists of the amino acid sequence

Ala - Leu - Asp - Ala - Ala - Tyr - Cys - Phe - Arg - Asn - Val - Gln - Asp -
Asn - Cys - Cys - Leu - Arg - Pro - Leu - Tyr - Ile - Asp - Phe - Lys - Arg -
Asp - Leu - Gly (SEQ ID NO: 1)

including any functional equivalents thereof obtained by addition, substitution or deletion of at least one amino acid.

5. The immunogenic composition according to claim 1, wherein said fragment of TGF- β essentially consists of the amino acid sequence

Ala - Leu - Asp - Ala - Ala - Tyr - Cys - Phe - Arg - Asn - Val - Gln - Asp -
Asn - Cys - Cys - Leu - Arg - Pro - Leu - Tyr - Ile - Asp - Phe - Lys - Arg -
Asp - Leu - Gly (SEQ ID NO:1)

6. The immunogenic composition according to any of claims 1 to 4, wherein said substitution is a conservative amino acid substitution.

7. The immunogenic composition according to claim 6, wherein said glycine (Gly) of said fragment of TGF- β is substituted with an amino acid selected from the group of amino acids consisting of Ala, Val, Leu, and Ile.

8. The immunogenic composition according to claim 6, wherein at least one of said alanines (Ala) of said fragment of TGF- β is substituted with an amino acid selected from the group of amino acids consisting of Gly, Val, Leu, and Ile.

9. The immunogenic composition according to claim 6, wherein said valine (Val) of said fragment of TGF- β is substituted with an amino acid selected from the group of amino acids consisting of Gly, Ala, Leu, and Ile.

10. The immunogenic composition according to claim 6, wherein at least one of said leucines (Leu) of said fragment of TGF- β is substituted with an amino acid selected from the group of amino acids consisting of Gly, Ala, Val, and Ile.

5 11. The immunogenic composition according to claim 6, wherein said isoleucine (Ile) of said fragment of TGF- β is substituted with an amino acid selected from the group of amino acids consisting of Gly, Ala, Val and Leu.

10 12. The immunogenic composition according to claim 6, wherein at least one of said aspartic acids (Asp) of said fragment of TGF- β is substituted with an amino acid selected from the group of amino acids consisting of Glu, Asn, and Gln.

15 13. The immunogenic composition according to claim 6, wherein at least one of said phenylalanines (Phe) of said fragment of TGF- β is substituted with an amino acid selected from the group of amino acids consisting of Tyr, Trp, His, Pro, and preferably selected from the group of amino acids consisting of Tyr and Trp.

20 14. The immunogenic composition according to claim 6, wherein at least one of said tyrosines (Tyr) of said fragment of TGF- β is substituted with an amino acid selected from the group of amino acids consisting of Phe, Trp, His, Pro, and preferably selected from the group of amino acids consisting of Phe and Trp.

25 15. The immunogenic composition according to claim 6, wherein at least one of said arginines (Arg) of said fragment of TGF- β is substituted with an amino acid selected from the group of amino acids consisting of Lys and His.

30 16. The immunogenic composition according to claim 6, wherein said lysine (Lys) of said fragment of TGF- β is substituted with an amino acid selected from the group of amino acids consisting of Arg and His.

17. The immunogenic composition according to claim 6, wherein at least one of said asparagines (Asn) of said fragment of TGF- β is substituted with an amino acid selected from the group of amino acids consisting of Asp, Glu, and Gln.

18. The immunogenic composition according to claim 6, wherein said glutamine (Gln) of said fragment of TGF- β is substituted with an amino acid selected from the group of amino acids consisting of Asp, Glu, and Asn.

5 19. The immunogenic composition according to claim 6, wherein said proline (Pro) of said fragment of TGF- β is substituted with an amino acid selected from the group of amino acids consisting of Phe, Tyr, Trp, and His.

10 20. The immunogenic composition according to claim 6, wherein at least one of said cysteines (Cys) of said fragment of TGF- β is substituted with an amino acid selected from the group of amino acids consisting of Asp, Glu, Lys, Arg, His, Asn, Gln, Ser, Thr, and Tyr.

15 21. The immunogenic composition according to any of the preceding claims, wherein said immunostimulating effect is characterised by an enhanced antibody response.

20 22. The immunogenic composition according to any of the claims 1-20, wherein said immunostimulating effect is characterised by a cytotoxic response.

23. The immunogenic composition according to claim 21, wherein said response is caused by an increase in at least one class of immunoglobulins.

25 24. The immunogenic composition according to claim 23, wherein said increase involves a plurality of immunoglobulin classes.

25. The immunogenic composition according to claim 23, wherein said response is caused by an increase in the level of T-cells.

30 26. The immunogenic composition according to claim 23, wherein said response is caused by an increase in the level of cytotoxic T-cells.

27. The immunogenic composition according to claim 1, wherein said fragment and said immunogenic determinant are both non-conjugated.

28. The immunogenic composition according to claim 1, wherein said fragment is conjugated and said immunogenic determinant is non-conjugated.

5 29. The immunogenic composition according to claim 1, wherein said fragment is non-conjugated and said immunogenic determinant is conjugated.

30. The immunogenic composition according to claim 1, wherein said fragment and said immunogenic determinant are both conjugated.

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31. The immunogenic composition according to claim 30, wherein said fragment is conjugated to said immunogenic determinant.

32. The immunogenic composition according to claim 1 further comprising a carrier.

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33. The immunogenic composition according to claim 32, wherein said fragment and said immunogenic determinant are both non-conjugated.

34. The immunogenic composition according to claim 33, wherein said carrier is non-conjugated.

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35. The immunogenic composition according to claim 33, wherein said carrier is conjugated.

25 36. The immunogenic composition according to claim 32, wherein said fragment is conjugated and said immunogenic determinant is non-conjugated.

37. The immunogenic composition according to claim 36, wherein said carrier is non-conjugated.

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38. The immunogenic composition according to claim 36, wherein said carrier is conjugated

39. The immunogenic composition according to claim 38, wherein said fragment is conjugated to said carrier.

40. The immunogenic composition according to claim 32, wherein said fragment is non-conjugated and said immunogenic determinant is conjugated.

41. The immunogenic composition according to claim 40, wherein said carrier is non-conjugated.

42. The immunogenic composition according to claim 40, wherein said carrier is conjugated

43. The immunogenic composition according to claim 42, wherein said immunogenic determinant is conjugated to said carrier.

44. The immunogenic composition according to claim 32, wherein said fragment and said immunogenic determinant are both conjugated.

45. The immunogenic composition according to claim 44, wherein said fragment is conjugated to said immunogenic determinant.

46. The immunogenic composition according to any of claims 44 and 45, wherein said carrier is non-conjugated.

47. The immunogenic composition according to any of claims 44 and 45, wherein said carrier is conjugated.

48. The immunogenic composition according to claim 47, wherein said fragment is conjugated to said carrier.

49. The immunogenic composition according to claim 47, wherein said immunogenic determinant is conjugated to said carrier.

50. The immunogenic composition according to claim 47, wherein said carrier is conjugated to said fragment and to said immunogenic determinant.

5 51. The immunogenic composition according to any of claims 1 to 50 further comprising an adjuvant.

10 52. The immunogenic composition according to any of claims 1 to 4, wherein said addition or deletion is an addition or a deletion of from 2 to preferably 10 amino acids, such as from 2 to 8 amino acids, for example from 2 to 6 amino acids, such as from 2 to 4 amino acids.

53. A vaccine comprising the immunogenic composition according to any of claims 1 to 52.

15 54. The immunogenic composition according to any of claims 1 to 52 or vaccine according to claim 53 for use in a method of immunising an individual in need of immunisation.

20 55. The immunogenic composition according to any of claims 1 to 52 or vaccine according to claim 53 for use in a method of immunising an individual in need of immunisation, said method comprising the steps of

- 25 i) providing said immunogenic composition or said vaccine, and
ii) administering said immunogenic composition or said vaccine to said individual.

30 56. A fragment of TGF- β capable of facilitating an immunostimulating effect in an individual for use as a medicament.

57. A method of immunising an individual in need of immunisation, said method comprising the steps of

- i) providing an immunogenic composition according to any of claims 1 to 52, or a vaccine according to claim 53, and
- ii) administering said immunogenic composition or said vaccine to said individual.

58. The method according to claim 57, wherein at least 50 % of individuals exposed to said immunogenic composition or vaccine are immunised.

59. Use of a fragment of TGF- β capable of facilitating an immunostimulating effect in an individual in the manufacture of an immunogenic composition or a vaccine.

60. Use according to claim 59 for the manufacture of a medicament for enhancing the immunostimulating effect of an immunisation.